

Taxonomic delimitation of the genus *Tibetoseris* SENNIKOV and the new genus *Pseudoyoungia* of the Compositae-Cichorieae from Eastern Himalaya

D. MAITY* & G. G. MAITI**

*Department of Botany, Taxonomy and Biosystematics Lab.
University of Calcutta

35, Ballygunge Circular Road, Kolkata - 700 019, West Bengal, India
debmaity@yahoo.com

**Department of Botany, University of Kalyani
Kalyani-741235, Nadia, West Bengal, India

Abstract

The genus *Tibetoseris* SENNIKOV is circumscribed here as monotypic with the single species *T. depressa* (HOOK. f. & THOMSON) SENNIKOV, which was known as *Crepis depressa* HOOK. f. & THOMSON or *Youngia depressa* (HOOK. f. & THOMSON) BABCOCK & STEBBINS. Its independent taxonomic status is explained and a new variety is recognized. The new genus *Pseudoyoungia* D. MAITY & MAITI (Compositae-Cichorieae) is proposed based on the remaining nine species of *Tibetoseris* SENNIKOV kept under two sections including the typical one. New combinations are made for these nine species.

Introduction

CASSINI (1831) had established the genus *Youngia* CASS. for some diversified tropical weeds mainly distributed in East Asia (SENNIKOV & ILLARIONOVA 2008). After that several studies including monographic work had been done to highlight the generic delimitation of the genus till the 20th century (LEDEBOUR 1843–46, BABCOCK & STEBBINS 1937, KAMELIN & KOVALEVSKAYA 1993). About 25–30 species had also been added to the genus *Youngia* by different workers in the form of scattered papers. Presently the genus *Youngia* comprises 30 species (LACK 2007) or about 40 species (BREMER 1994, MABBERLEY 2005). Recently SENNIKOV (in TZVELEV 2007) and SENNIKOV & ILLARIONOVA (2008) have tried to resolve the generic delimitation of the genus *Youngia* and have segregated three new genera based on the sections recognized by BABCOCK & STEBBINS (1937), viz., *Tibetoseris*

SENNIKOV, *Crepidifolium* SENNIKOV, and *Sonchella* SENNIKOV. The genus *Youngia* together with these three segregates and *Ixeris* (CASS.) CASS., *Crepidiastrum* NAKAI, *Ixeridium* (A. GRAY) TZVELEV and *Askellia* W.A. WEBER were united in a new subtribe *Ixeridinae* SENNIKOV.

Tibetoseris SENNIKOV is currently considered to have 10 species of which 5 were previously kept under *Youngia* sect. *Desiphylum* by BABCOCK & STEBBINS (1937). Two further species were described by SHIH (1995) and SHIH & CAI (in SHIH 1995) in *Youngia*, another two new species and a new combination based on *Crepis tianschanica* SHIH were published by TZVELEV (2007).

At present the 10 species of *Tibetoseris* are classified in three sections: *Tibetoseris* sect. *Tibetoseris* with only one species (*T. depressa*); sect. *Parvae* SENNIKOV with two species (*T. parva* and *T. conjunctiva*) and sect. *Simulatrices* SENNIKOV with the remaining 7 species (*T. simulatrix*, *T. gracilipes*, *T. cristata*, *T. sericea*, *T. angustifolia*, *T. ladyginii* and *T. tianschanica*).

In the last six years the present authors have come across a large number of Compositae species in the Sikkim Himalaya including many members of the tribe Cichorieae (MAITY & CHAUHAN 2002, MAITY & MAITI 2001, 2007a, b, MAITY 2005). Among these are *Dubyaea hispida* (D. DON) DC. (a member of a primitive genus of 14 species, cf. BABCOCK & STEBBINS 1937, BREMER 1994, LACK 2007), many species of *Lactuca* L., *Youngia* (s.l.), *Stebbinsia umbrella* (FRANCH.) LIPSCH. [syn. *Crepis umbrella* FRANCH. or *Sorosseris umbrella* (FRANCH.) STEBBINS] as well as many collections of *Tibetoseris depressa* (HOOK. f. & THOMSON) SENNIKOV (= *Crepis depressa* HOOK. f. & THOMSON).

The latter taxon, known to us from several collections from different localities in Sikkim, appeared odd in several respects, and this triggered a critical study on its taxonomic position. It has been thoroughly studied both in herbaria (CAL and BSHC) and in the field, along with anatomical features of cypselas, and it is finally concluded that *Crepis depressa* is a unique taxon which requires independent generic status, although it shares some characters with the related genera like *Youngia* (s.l.), and *Stebbinsia* LIPSCH. (a genus often included in *Sorosseris* STEBBINS). After our critical study we would like to recognize the genus *Tibetoseris* as monotypic with the species *T. depressa* alone, excluding the remaining 9 species, which are placed under the presently proposed new genus *Pseudoyoungia* with two sections, *Pseudoyoungia* and *Simulatrices*. This proposal and its justification are explained in the following.

Materials and Methods

A total of 19 herbarium specimens of *Crepis depressa*, 12 specimens of *Youngia*

gracilipes, 10 specimens of *Y. simulatrix* and 35 specimens of *Youngia japonica* at Central National Herbarium (CAL) as well as the recent collections at the herbarium of Botanical Survey of India, Sikkim Himalayan Circle, Gangtok (BSHC) were studied. The relevant literature was also consulted.

Based on the studied specimens the morphological features of leaves, receptacle, relative length of corolla tube and ligule, stigmatic surface, cypselas and also the transverse section of cypselas, cellular view of pericarp were studied and the illustrations, camera lucida drawings and the photographs taken from Leica DME image analyzer and Magnus binocular microscope are provided to analyse the characteristic features of *Crepis* (*Youngia* or *Tibetoseris*) *depressa* and compared with genera *Youngia* (s.l.), and *Stebbinsia*.

Results

Crepis depressa is strikingly distinct by the orbicular-ovate to deltoid-triangular leaf blades with denticulate to entire margin, or if lyrate, then the terminal lobe is alike a typical blade, and the numerous, congested and relatively large capitula surrounded by the crowded leaves like a crown. In these features the taxon differs significantly from all species of *Youngia*. Furthermore, the receptacle is areolate and fimbriate instead of areolate and glabrous (naked) as in other species of *Youngia*. In the genus *Youngia* the corolla tube is much shorter than the ligule, while in *Crepis depressa* the relative length of tube and ligule is fairly constantly 1:1 (studied in the specimens deposited at CAL and BSHC and also reported by BABCOCK & STEBBINS 1937). The corolla tube is glabrous, whereas there is a general tendency of hairiness on the outer surface of the corolla tube in most species of *Youngia* (s.l.).

Anther tails are mostly free in *Crepis depressa*, but they are united in the other species of sect. *Desiphylum* as well as in most species of *Youngia* (s.l.).

The pollen grains have an echinate exine as found in many Asteraceous species including *Stebbinsia umbrella*. The stylar surface and the stigmatic branches are densely barbellate. The barbs on stylar surface below the forking part are few and initially they are in groups below the forking part. The colour of stigmatic branches is dark-brown to black both in fresh material and after drying. The cypselas have a distinct coarse beak and is straw-coloured with numerous randomly scattered brown patches (Fig. 1H; Pl. 1C). The coloration is depending on the deposition of pigment in the epidermal cells of the pericarp as visible under light microscopic view. In other species of *Youngia* (s.l.) the cypselas are usually not beaked and have a uniform colour

According to the opinion of BABCOCK & STEBBINS (1937, pp.8–11) in *Youngia*

(s.l.), “as a general rule, at least the outer achenes (cypsels) are consistently flattened” and on the basis of this character only these authors placed *Crepis depressa* under *Youngia*. A study of the recent collections (RAJU 4421, RAI 7356, SINHA & SHUKLA 20455, SHUKLA & MAITI 18900, MAITY 26880, MAITI & SINHA 22485, MAITY & PRADHAN 26880 – all at BSHC) does not show much difference between the inner and outer cypsels. Outer cypsels are slightly flattened and possess alternating broad and narrow ribs (Fig. IJ, Pl.1C,D). Obviously the slight compression or flattening of outer cypsels does not constitute a basis for generic delimitation. In other respects, the cypsel of *C. depressa* is very different from those of *Youngia* (s.l.) including the species of sect. *Desiphylum*. In *C. depressa* the cypsels are significantly larger (more than (5–)7 mm long) with 10 ribs, while in *Youngia* (s.l.) cypsels are smaller, always less than 5 mm long, and with 12–15 ribs (cf. LACK 2007). The ribs are free and not fused in triplets at base. But in *Youngia* (s. str.) the ribs are fused in triplets at base (SENNIKOV & ILLARIONOVA 2008). BABCOCK & STEBBINS (1937) had reported a 10–12-ribbed cypsel in *C. depressa*. However, in our specimens as well as specimens at CAL the cypsels always have 10 ribs (5 major and 5 minor) and very rarely 9 ribs, which may be due to immaturity. Similarly 11 ribs are found due to separation of one large rib at middle part of cypsel, but the basal and apical regions are again with 10 ribs (Pl.1C₃). Moreover, the figure provided by BABCOCK & STEBBINS (1937, Fig. 1g) shows a typical 10-ribbed cypsel with 5 major ribs alternating with 5 minor ribs, and not 12 ribs as mentioned in the text (op.cit., p. 34).

The cypsels of *C. depressa* possess two stronger and broader/flattened lateral ribs compared to the narrowly wing-like ribs in *Youngia*. Interestingly, these large strong lateral ribs are not separable from other large ribs and are equal to them. This observation was also supported by BABCOCK & STEBBINS (1937). The anatomical sections of cypsel, further, show that the nature of the ridges and furrows of cypsel of *Crepis depressa* demand special attention. It is noteworthy that in the cross sections of the pericarp the ridges are widely rounded but furrows are acute on outer surface. The outline of inner surface of pericarp, in transverse section also shows similar characteristic features of both ridges and furrows forming a distinct strongly undulating line due to presence of large vallecular canals (Fig. IJ,K, Pl.1D,E,F). However, this feature does not occur in other species of sect. *Desiphylum* nor in *Youngia* (s.l.), where the inner surface of pericarp is always straight or entire, and does not show distinct ridges or furrows except in *Y. scaposa*.

The anatomy of the cypsel is quite unique. Epidermal cells contain brownish substances (tanniferous?) and are mostly invisible, covered with a thick cuticle. Papillate outgrowths or projections have been seen. Pericarp is entirely made up of sclerenchymatous cells except epidermis. Interestingly, in other species of

Youngia including sect. *Desiphylum* the pericarp is made up of parenchymatous cells with small patches of sclerenchymatous cells only in ridges (SENNIKOV & ILLARIONOVA 2008, Fig. 2. no. 1–16). In the acute furrows there are a few disorganized (parenchymatous?) cells. Very large vallecular canals are present below the ridges. There are 10 ribs, alternately large and small, 5 vascular strands and the destroyed testa. Endosperm cells are elongated (Fig. 1J, K, Pl. 1D–F).

Comparative morpho-anatomical studies of the closely related species of *Youngia* (s.l.), *Stebbinsia umbrellae* and the new genus *Pseudoyoungia* described below emphasized the distinct taxonomic position of *C. depressa* (Table 1).

Discussion and Conclusions

Our current study shows that the outer cypselas are only slightly more flattened than the inner ones, and this feature is not of much use in the delimitation of taxa. The much smaller outer involucre bracts in comparison to the inner ones is a character also present in the genus *Stebbinsia* (MAITY & MAITY 2007a) as well as in the whole subtribe Crepidinae (LACK 2007). Therefore, these characters cannot be used for the delimitation of the genera within Crepidinae. Moreover, these features are rightly considered rather as subtribe characters by SENNIKOV & ILLARIONOVA (2008).

Our study nevertheless shows that *Crepis depressa* is a unique taxon in morphological and reproductive characters. The related genera are *Youngia* (s.l.), and *Stebbinsia* (*S. umbrellae*). The affinities of this taxon within *Youngia* (s.l.) may be with species like *Y. pratti* (BABC.) BABC. & STEBBINS having areolate or subfimbriate receptacle (fimbriae low, naked), *Y. stenoma* (TURCZ.) LEDEB. where corolla tube is slightly shorter than ligule, and *Y. mairei* (H. LÉV.) BABC. & STEBBINS and *Y. henryi* (DIELS) BABC. & STEBBINS both having free anther tails. The alternating larger and smaller ribs of cypselas constitute another important character linking *C. depressa* with *Youngia* (s.l.), but the different wall structure of inner surface of pericarp, presence of large vallecular canals as well as entire sclerenchymatous cellular view of pericarp (mesocarp) in *Crepis depressa* immediately separate it from *Youngia* (s.l.). Moreover, the wider, flattened lateral ribs (not wing-like) which are inseparable from other major ribs found in *C. depressa* are very uncommon in this group. The much smaller outer involucre bracts are already considered a subtribe character by SENNIKOV & ILLARIONOVA (2008).

Stebbinsia umbrellae is the taxon most similar to *Crepis depressa* in vegetative features, and also in pollen exine ornamentation and size ratio of ligule and corolla tube in such a way that they may be mistaken for the same species, although

there is major difference with respect to cypselar morphology (MAITY & MAITI 2007a).

Stebbinsia (Crepis) umbrella is very different from all other species of *Sorosseris*. Distinctive generic features in *Sorosseris* are the only two outer involucrel bracts, shorter than or exceeding inner ones; inner bracts 4, herbaceous with broad scarious margins and 4–6 florets in each capitulum. On the other hand in *S. umbrella* the involucrel bracts are many, biseriata with outer ones (3–)5 in number, much shorter than the 13–19 strongly coriaceous inner ones, and there are 15–43 florets per capitulum (GRIERSON & SPRINGATE 2001, MAITY & MAITI 2007a). So, LIPSCHITZ (1956) justified these differences by creating a new genus *Stebbinsia* LIPSCH. based on this unique taxon. LACK (2007) had returned back the species *Stebbinsia umbrella* to *Sorosseris* as *Sorosseris umbrella* (FRANCH.) STEBBINS and thus, unfortunately creating a heterogeneity to this generic character as was done by STEBBINS (1940). We strongly support the independent status of the distinct genus *Stebbinsia* leaving the remaining species of *Sorosseris* in that genus. This opinion is also supported by GRIERSON & SPRINGATE (2001).

Crepis depressa is related only to this taxon and not to other species of *Sorosseris* by having similar morphological appearance, biseriata involucre, and equal length of ligule and corolla tube. In fact *Crepis depressa* is a unique taxon having its own distinctive characters, though related to *Stebbinsia* or *Youngia* (s.l.), by some similar features, but these relationships are largely indirect as mentioned by BABCOCK & STEBBINS (1937). It is not a species of *Youngia* or *Crepis*, not even a close relative at all (BABCOCK & STEBBINS 1937, SENNIKOV & ILLARIONOVA 2008).

Lactuca cooperi J. ANTHONY shares vegetative as well as reproductive features with *C. depressa* and is treated as a synonym (as also done by GRIERSON & SPRINGATE 2001). Also the specimens from Sikkim described by us (MAITY & MAITI 2001) as *Lactuca pseudoumbrella* D. MAITY & MAITI along with its var. *chauhani* D. MAITY & MAITI are truly *C. depressa*. Thus the same species has been variously considered under *Youngia* (BABCOCK & STEBBINS 1937), as a new species of *Lactuca* by ANTHONY (1934) and again by MAITY & MAITI (2001). Obviously it is a taxon subject to repeated misidentification, and its deceptive similarity to *Stebbinsia* has also been referred to above.

SENNIKOV (in TZVELEV 2007) established the new genus *Tibetoseris* SENNIKOV based on *Youngia* sect. *Desiphylum* BABC. & STEBBINS. However, unfortunately the problem regarding the taxonomic status of *Crepis depressa* has not been solved, and the genus *Tibetoseris* remains a heterogeneous group as it was as sect. *Desiphylum* in BABCOCK & STEBBINS (1937). However, the latter authors indicated that this species /i.e. *C. depressa*/ is not closely related to the other tufted species of this genus" (BABCOCK & STEBBINS 1937, p. 35). SENNIKOV & ILLARIONOVA

(2008) also mentioned that the first section of *Youngia* s.l. in BABCOCK's system, *Desiphylum*, is most problematic: "For the time being we keep this group separate in *Ixeridinae* until further evidences show the other way to classify it" (p. 77).

The many diagnostic features of *Crepis depressa*, viz., suborbicular, entire to remotely denticulate or lyrate leaves, unwinged petiole, absence of old petiole bases on poorly developed stem, presence of cataphylls, areolate and fimbriate receptacle, 14–21 florets per capitulum, equal length of ligule and corolla tube, free anther tails, dark brown to black style branches, exceptionally large cypsela with a coarse strong beak and the unique colour of cypsela and the nature of pericarp in transverse section, cellular view of pericarp and very long pappus readily refute the inclusion of this taxon in the genus *Youngia* (s.l.) or the genus *Tibetoseris* as presently circumscribed and demand its independent generic position.

In conclusion the genus *Tibetoseris* should be monotypic with its single species *T. depressa* (HOOK. f. & THOMSON) SENNIKOV and for the remaining nine species the new genus *Pseudoyoungia* is here proposed. A new variety of *T. depressa* is also included here.

Amplified diagnosis of the genus *Tibetoseris*

Tibetoseris SENNIKOV in TZVELEV, Bot. Zhurn. (Moscow & Leningrad) 92 (11): 1749. 2007; SENNIKOV, Komarovia 5(2): 90. 2008. (Fig. 1; Pl. 1).

Tufted, perennial, laticiferous herb with strong vertical taproot. Caudex thick, strong, without withered old leaf bases. Stem absent. Leaves radical, rosulate, few to many, orbicular to broadly ovate or deltoid, entire or remotely denticulate or if lyrate, then terminal lobe alike the typical blade, glabrous or sparsely hairy along veins towards base; petioles long, unwinged; cataphylls often present. Capitula ligulate, few or many (>30), large, congested, surrounded by crown of leaves, with 14–21 florets. Involucre biseriate; outer phyllaries much shorter ($\frac{1}{3}$) than inner, setose outside along midrib, ciliate at apex; inner phyllaries (14–)15–17 mm long, setose outside along midrib, ciliate and crested at apex. Receptacle areolate-fimbriate. Florets 14–17 mm long; corolla tube glabrous, equal to ligule in length. Anther tails free. Pollen echinate. Style branches black. Cypselas slightly compressed, more than (5–)7 mm long, with a strong coarse beak, 10-ribbed, hispid towards apex, yellow with dense blackish-brown patches; pericarp sclerenchymatous throughout; inner surface of pericarp ridged and furrowed with strong undulate line. Vallecular canals very large. Pappus biseriate, 11–13 mm long, white or stramineous, persistent. Chromosome number $n=8$.

TYPE: *Tibetoseris depressa* (HOOK. f. & THOMSON) SENNIKOV.

Tibetoseris depressa* (HOOK. f. & THOMSON) SENNIKOV var. *depressa

TYPE: INDIA: Sikkim, Kupup, 4500--5000 m alt., 9.X.1849, J. D. HOOKER (K, lectotype, selected by BABCOCK & STEBBINS 1937; B, G-DL, isolectotypes).

Crepis depressa HOOK. f. & THOMSON [C. B. CLARKE, Comp. Indicae 255. 1878, nom. nud., pro syn.] in HOOK. f., Fl. Brit. India 3: 397. 1881.

Youngia depressa (HOOK. f. & THOMSON) BABC. & STEBBINS, Publ. Carnegie Inst. Wash. 484: 33. 1937.

Lactuca cooperi J. ANTHONY in Notes Royal Bot. Gard. Edinburgh 18: 198. 1934.

Lactuca pseudoumbrella D. MAITY & MAITI var. *chauhani* D. MAITY & MAITI in J. Econ. Taxon. Bot. 25(3): 750. 2001, syn. nov.

The specimens described as *Lactuca pseudoumbrella* var. *pseudoumbrella* have a larger growth-form than *Tibetoseris depressa* var. *depressa* and more numerous capitula, but are here regarded as conspecific, although worthy of distinction on an infraspecific level. The leaves are also variable in shape from orbicular to deltoid-triangular.

***Tibetoseris depressa* (HOOK. f. & THOMSON) SENNIKOV var. *pseudoumbrella* (D. MAITY & MAITI) D. MAITY & MAITI stat. et comb. nov.**

Basionym: *Lactuca pseudoumbrella* D. MAITY & MAITI var. *pseudoumbrella* in J. Econ. Taxon. Bot. 25(3): 750. 2001. – TYPE: Muguthang, North Sikkim, Muguthang (Lhonak valley), 31.VII.1999, MAITI & SINHA 22485 (CAL!, holotype; BSHC!, isotype).

Key to the varieties of *Tibetoseris depressa*:

1. Plants 6–7 cm in diam., capitula few to several (up to 20)..... var *depressa*
 1. Plants larger, 10–15 cm in diam., capitula numerous (more than 30)
 var. *pseudoumbrella*

Description of the new genus *Pseudoyoungia*

***Pseudoyoungia* D. MAITY & MAITI, gen. nov.** – [*Youngia* CASS. sect. *Desiphylum* BABC. & STEBBINS, Publ. Carnegie Inst. Wash. 484: 25. 1937, nom. inval., p.p.; *Tibetoseris* SENNIKOV in TZVELEV, Bot. Zhurn. (Moscow & Leningrad) 92(11): 1749. 2007, p.p., excl. typo; SENNIKOV, Komarovia 5(2): 90. 2008, p.p.].

Plantae perennes, radice lignoso verticali et rhizomate tenui repenti; caules vel subcaules; folia petiolata laminis lyratis vel pinnatifidis; petioli alati foliorum

veterum basibus plerumque persistentibus; calathidia (5-)9-20(-30) flora; involucrem biseriali; phyllis internis 8-12, 8-11(-16) mm lg., glabris vel nervo centrali setosis, ad apicem excrescentiis adnatis vel nullis; phyllis externis glabris, internis quadruplo ($-\frac{2}{3}$) brevioribus; corolla (13-)14-17 mm lg., tubo medio, 4-5 mm lg.; cypsela cylindrica, leviter compressa, costis 10-15 distinctis, valde inaequalibus vel subaequalibus; pappus biserialis, albus vel stramineus, fragilis. Numerus chromosomatum $n = 8$.

Plants tufted, perennial, with vertical strong taproot or slender creeping rhizome; stem absent or very short; leaves with sinuate-dentate, lyrate or pinnatifid blades, distinctly petiolate; petioles winged; old petiolar base often persistent; capitula with (5-)9-20(-30) florets; involucre biserial; inner phyllaries 8-12 in number, 8-11(-16) mm long, glabrous or setose along the central nerve, sometimes conspicuously crested at the apex; outer phyllaries glabrous, $\frac{1}{4}$ ($-\frac{2}{3}$) as long as the inner ones; corolla (13-)14-17 mm long, with a medium sized tube (4-5 mm); cypsela cylindric, slightly compressed, with 10-15 prominently unequal (alternately wide and narrow) or almost equal ribs; pappus biserial, white or straw-yellow, caducous. Chromosome no. $n = 8$.

TYPE: *Pseudoyoungia parva* (BABC. & STEBBINS) D. MAITY & MAITI.

Pseudoyoungia sect. 1. *Pseudoyoungia* [*Tibetoseris* SENNIKOV sect. *Parvae* SENNIKOV]

1. *Pseudoyoungia parva* (BABC. & STEBBINS) D. MAITY & MAITI, comb. nov.

Basionym: *Youngia parva* BABC. & STEBBINS, Publ. Carnegie Inst. Wash. 484: 35. 1937.

Syn.: *Tibetoseris parva* (BABC. & STEBBINS) SENNIKOV, Komarovia 5(2): 91. 2008. - TYPE: CHINA. Northern Szechwan, Sanchá-trü, precipice, 4300-4500 m alt., 10.VIII.1922, HARRY SMITH 3218 (UPS, holotype).

Plants with strong taproot; leaves sinuately or runcinately dentate to pinnatifid; involucre 10-11 mm long; phyllaries ventrally densely pilose; corolla tube 4-5 mm long, pilose.

Distribution: CHINA.

2. *Pseudoyoungia conjunctiva* (BABC. & STEBBINS) D. MAITY & MAITI, comb. nov.

Basionym: *Youngia conjunctiva* BABC. & STEBBINS, Publ. Carnegie Inst. Wash. 484: 37. 1937.

Syn.: *Tibetoseris conjunctiva* (BABC. & STEBBINS) SENNIKOV, Komarovia 5 (2): 91. 2008. - TYPE: CHINA. Southwestern Kansu, upper Tebbu region, grassy slopes at foot of Shimen, 12000 feet, 7.VIII.1925, J. F. ROCK 13062 (UC 489434, holotype; B, GH, isotypes).

Distribution: CHINA.

***Pseudoyoungia* sect. 2. *Simulatrices* (SENNIKOV) D. MAITY & MAITI, comb. nov.**

Basionym: *Tibetoseris* sect. *Simulatrices* SENNIKOV, Komarovia 5(2): 91. 2008.

Plants with a slender creeping rhizome; leaves sinuately dentate to pinnately lobed; involucre 9–16 mm long; phyllaries ventrally glabrous; corolla tube 4–5 mm long, glabrous.

TYPE: *Pseudoyoungia simulatrix* (BABC.) D. MAITY & MAITI.

3. *Pseudoyoungia simulatrix* (BABC.) D. MAITY & MAITI, comb. nov.

Basionym: *Crepis simulatrix* BABC., Univ. Calif. Publ. Bot. 14: 329. 1928.

Syn.: *Youngia simulatrix* (BABC.) BABC. & STEBBINS, Publ. Carnegie Inst. Wash. 484: 39. 1937; *Tibetoseris simulatrix* (BABC.) SENNIKOV, Komarovia 5(2): 91. 2008. (Fig. 2 A–D). - TYPE: CHINA. Xizang: Southern Tibet, Nalamlam, sandy place, 4200 m, 1882, GYATSKO (Dr. KING's collector) (G, holotype; B, CAL, GH, P, isotypes).

Crepis smithiana HAND.-MAZZ., Acta Horti Gothob. 12: 357. 1938. - TYPE: CHINA. Sichuan: Taofu (Dawo), Taining (Ngata); in ripa glareosa fluminis, 3600 m, 04.IX.1934, HARRY SMITH 11746 (UPS, holotype; A, isotype).

Taraxacum altune D. T. ZHAI & C. H. AN, J. Aug. 1st Agric. College 18(3): 1. 1995 (n. v.). - TYPE: CHINA. Xinjiang: Qiemo, Y. H. WU 2644 (HNWP, holotype).

Distribution: INDIA: Himalaya: Sikkim; NEPAL; CHINA.

4. *Pseudoyoungia gracilipes* (HOOK. f.) D. MAITY & MAITI, comb. nov.

Basionym: *Crepis gracilipes* HOOK. f., Fl. Brit. India 3: 396. 1882.

Syn.: *Youngia gracilipes* (HOOK. f.) BABC. & STEBBINS, Publ. Carnegie Inst. Wash. 484: 40. 1937; *Tibetoseris gracilipes* (HOOK. f.) SENNIKOV, Komarovia 5(2): 92. 2008. (Fig. 2 E–G). - TYPE: INDIA. Sikkim, alpine region, 1849, J. D. HOOKER (K, lectotype, selected by BABCOCK & STEBBINS 1937).

Distribution: INDIA. Himalaya: Uttaranchal, Sikkim; NEPAL; BHUTAN;

CHINA.

5. *Pseudoyoungia cristata* (C. SHIH & C. Q. CAI) D. MAITY & MAITI, comb. nov.

Basionym: *Youngia cristata* C. SHIH & C. Q. CAI, Acta Phytotax. Sin. 33(2): 186. 1995.

Syn.: *Tibetoseris cristata* (C. SHIH & C. Q. CAI) SENNIKOV, Komarovia 5(2): 92. 2008. - TYPE: CHINA. Xizang: Zayü, alt. 3900 m, IX.1935, C. W. WANG 66121 (PE, holotype).

Distribution: CHINA.

6. *Pseudoyoungia sericea* (C. SHIH) D. MAITY & MAITI, comb. nov.

Basionym: *Youngia sericea* C. SHIH, Acta Phytotax. Sin. 33(2): 186. 1995, nom. inval. (2 types cited); C. SHIH in SENNIKOV, Komarovia 5(1): 48. 2007.

Syn.: *Tibetoseris sericeus* (C. SHIH) SENNIKOV, Komarovia 5(2): 92. 2008. - TYPE: CHINA. Xizang: Zayü, Mt. Karwar-kar-boo, Tsa-wa-rung, 3400 m, IX.1935, C. W. WANG 66254 (P, holotype; A, isotype).

Distribution: CHINA.

7. *Pseudoyoungia angustifolia* (TZVELEV) D. MAITY & MAITI, comb. nov.

Basionym: *Tibetoseris angustifolia* TZVELEV, Bot. Zhurn. (Moscow & Leningrad) 92(11): 1750. 2007. - TYPE: CHINA. Kam (Tibet), systema fl. Jan-tzy-tzsjan (Golubaja), in cursu superiore fl. J-czju, 13000 ft., in fissuris rupium, 29.VII.1900, V. F. LADYGIN 432 (LE, holotype).

Distribution: CHINA.

This species may be conspecific with *P. gracilipes*.

8. *Pseudoyoungia ladyginii* (TZVELEV) D. MAITY & MAITI, comb. nov.

Basionym: *Tibetoseris ladyginii* TZVELEV, Bot. Zhurn. (Moscow & Leningrad) 92(11): 1750. 2007. - TYPE: CHINA. Kam (Tibet), systema fl. Jan-Czy-Czjan (Golubaja), locus Nru-czju ad fl. Golubaja, 11700 ft., 25.VII.1900, V. F. LADYGIN 380 (LE, holotype).

Distribution: CHINA.

9. *Pseudoyoungia tianshanica* (C. SHIH) D. MAITY & MAITI, comb. nov.

Basionym: *Crepis tianshanica* C. SHIH (as “*tianshanica*”), Acta Phytotax. Sin. 33: 190. 1995.

Syn.: *Tibetoseris tianshanica* (C. SHIH) TZVELEV, Bot. Zhurn. (Moscow & Leningrad) 92(11): 1751. 2007. – TYPE: CHINA. Xinjiang: Thianshan Mt., Daniu He, in declivitate, alt. 2600 m, 23VII.1947, K. C. KUAN 2212 (PE, holotype).

Key to the species of *Pseudoyoungia*:

1. Plants with taproot; phyllaries ventrally pilose; corolla tube pilose2
 - Plants with creeping rhizome; phyllaries ventrally glabrous; corolla tube glabrous3
2. Plants to 5 cm tall *P. parva*
 - Plants more than 7 cm tall *P. conjunctiva*
3. Inner phyllaries dorsally appendaged..... *P. cristata*
 - Inner phyllaries dorsally not appendaged.....4
4. Pappus more than 10 mm long.....5
 - Pappus less than 7 mm long6
5. Peduncles pilose; inner phyllaries dorsally not spongy-thickened. *P. ladyginii*
 - Peduncles glabrous; inner phyllaries dorsally spongy -thickened at base.....
.....*P. simulatrix*
6. Inner phyllaries dorsally hairy.....7
 - Inner phyllaries dorsally glabrous8
7. Capitula 2, cymose; outer phyllaries about 7 mm long..... *P. tianshanica*
 - Capitula 5–9, fascicled; outer phyllaries 2–3 mm long.....*P. sericea*
8. Leaves linear-oblancoolate in outline.....*P. angustifolia*
 - Leaves oblanceolate, elliptic or narrowly elliptic in outline*P. gracilipes*

Table 1. Comparison of characters of *Pseudoyoungia* and related genera and species.

Sl. No.	Characters compared	<i>Tibetoseris depressa</i> (= <i>Crepis depressa</i>)	<i>Pseudoyoungia</i>	<i>Youngia</i> (s.l.)	<i>Stebbinsia umbrella</i>
1.	Appearance	Tufted, congested, like a crown	Tufted or diffused	Much diffused and slender	Tufted, congested, like a crown
2.	Stem	Stemless; caudex without old leaf bases	Stemless; caudex with old leaf bases	Well-developed	Stemless
3.	Leaf blade	Orbicular-ovate to deltoid-triangular, entire or remotely denticulate or lyrate	Oblanceolate, sinuate dentate, pinnatifid to pinnatisect	Oblanceolate, pinnatifid to pinnatisect	Orbicular-ovate, remotely denticulate to entire
4.	Petiole	Unwinged	Winged	Unwinged or winged	Unwinged
5.	Capitula	Several to many, congested, large-sized and surrounded by crown of crowded leaves	Few to several, medium-sized, sometimes surrounded by loose crown of leaves	Few to several, very diffused, small-sized and distantly placed from leaves	Several to many, congested, large-sized and surrounded by crown of crowded leaves

Sl. No.	Characters compared	<i>Tibetoseris depressa</i> (= <i>Crepis depressa</i>)	<i>Pseudoyoungia</i>	<i>Youngia</i> (s.l.)	<i>Stebbinsia umbrella</i>
6.	Involucral bracts	Biseriate; outer much shorter than inner; midrib hirtellous to hispidulous; apex ciliate	Biseriate; outer much shorter than inner; midrib hirtellous to hispidulous; apex ciliate	Biseriate; outer much shorter than inner; glabrous, if hairy then on inner surface; apex ciliate or eciliate	Biseriate; outer much shorter than inner; midrib hirtellous to hispidulous; apex ciliate
7.	Receptacle	Areolate and fimbriate	Areolate, but glabrous	Areolate, but glabrous	Areolate and fimbriate
	Corolla				
8.	a) Ratio of length of corolla tube and ligule	Corolla tube and ligule are equal in length (1:1)	Corolla tube shorter than the ligule	Corolla tube is much shorter than the ligule	Corolla tube and ligule are equal in length (1:1)
	b) Indumentum	Glabrous	Glabrous or hairy	Hairy	Glabrous
9.	Anther tails	Free	United	United	Free
10.	Pollen grains	Exine echinate	Exine echinate	In most species exine echinate	Exine echinate

Sl. No.	Characters compared	<i>Tibetoseris depressa</i> (= <i>Crepis depressa</i>)	<i>Pseudoyungia</i>	<i>Youngia</i> (s.l.)	<i>Stebbinsia umbrella</i>
11.	Surface of style and stigmatic branches	Barbs few below forking and initially in group	-	-	Barbs few below forking and initially in group
12.	Colour of stigmatic branches	Dark brown to black	Yellow	Yellow	Dark brown to black
13.	Cypselas				
	a) Shape	More than (5-7) mm long, coarsely beaked; outer ones slightly more flattened than inner	4-5 mm long, not beaked; cylindrical, slightly compressed	2-4 mm long, usually not beaked; outer ones distinctly more flattened than inner	3-6 mm long, not beaked; outer and inner indistinguishable
	b) Colour	Straw-coloured with randomly scattered numerous brown patches	Uniformly coloured, yellowish	Variously and uniformly coloured	Uniformly brownish

Sl. No.		<i>Tibetoseris depressa</i> (= <i>Crepis depressa</i>)	<i>Pseudoyoungia</i>	<i>Youngia</i> (s.l.)	<i>Stebbinsia umbrella</i>
Characters compared	c) Ribs	10, large and small ribs alternately arranged; two lateral ribs larger and wider	10–15, large and small ribs alternately arranged or ribs almost equal; lateral ribs wing-like	12–15, large and small ribs alternately arranged; two lateral ribs larger, wing-like	Striate, not ribbed
	d) Cross sectional structure	Outer surface of pericarp ridged and furrowed	Outer surface of pericarp ridged and furrowed	Outer surface of pericarp ridged and furrowed	Outer surface of pericarp striate
	e) Pericarp (mesocarp)	Inner surface of pericarp ridged and furrowed with strong undulating line	Inner surface of pericarp entire, not undulate	Inner surface of pericarp entire, not undulate	Inner surface of pericarp entire
	f) Vallecular canal	Sclerenchymatous throughout	Present, very large	Absent or inconspicuous	Absent or inconspicuous

Acknowledgements

We are grateful to Dr. L. S. SPRINGATE, Royal Botanic Garden, Edinburgh for his valuable suggestions and guidance. We are indebted to Dr. BERTIL NORDENSTAM, Swedish Museum of Natural History, Stockholm, and Dr. NORBERT KILIAN, Botanical Garden Berlin-Dahlem, Berlin, for their suggestions, corrections and final editing of the manuscript. We are also thankful to Dr. A. N. SENNIKOV, Botanical Museum, Museum of Natural History, University of Helsinki, for providing some valuable reprints. The authors also acknowledge the kind help provided by the Additional Director, Central National Herbarium (CAL) and Deputy Director, Sikkim Himalayan Circle (BSHC), Gangtok, Botanical Survey of India when consulting herbarium specimens. We are also grateful to Mrs. MANASI MAITY (MANDAL), research scholar, Department of Botany, University of Kalyani, W. B., India for her assistance in field and laboratory.

References

- ANTHONY, J. 1934. Diagnoses Specierum Novarum in Herbario Horti Regii Botanici Edinburgensis Cognitarum. *Notes Roy. Bot. Gard. Edinburgh* 18: 198.
- BABCOCK, E. B. & G. L. STEBBINS 1937. The Genus *Youngia* CASS. *Carnegie Inst. Wash. Publ.* 484: 1–108 + pls. 1–6.
- BREMER, K. 1994. *Asteraceae. Cladistics & Classification*. Timber Press, Portland, Oregon.
- CASSINI, H. 1831. *Youngia* H. CASS. Description de quelques Synanthérées de l'île Maurice. *Ann. Sci. Nat. (Paris)*, Ser. 1, 23: 84–93.
- GRIERSON, A. J. C. & L. S. SPRINGATE 2001. Compositae (Asteraceae). In: GRIERSON, A. J. C. & D. G. LONG (eds.), *Flora of Bhutan*, Vol. 2(3). Royal Botanic Garden, Edinburgh.
- KAMELIN, R. V. & S. S. KOVALEVSKAYA 1993. *Youngia* CASS. In: ADYLOV, T. A. & T. ZUCKERWANIK (eds.), *Conspectus Florae Asiae Mediae* 10, pp.137–141, 629. The Uzbekistan Academy of Sciences Publishing House, Tashkent.
- LACK, H. W. 2007. Tribe Cichorieae. In: KADEREIT, J. W. & C. JEFFREY (eds.), *The Families and Genera of Vascular Plants*, Vol. VIII, Flowering Plants. Eudicots. Asterales, pp. 180–199. Springer, Berlin, Heidelberg.
- LEDEBOUR, C. F. 1843–46. *Flora Rossica sive Enumeratio plantarum in totius imperii rossici provinciis Europaeis, Asiaticis, et Americanis hucusque observatarum* 2. E. Schweizerbart, Stuttgart.

- LIPSCHITZ, S. J. 1956. A new subtribe, genus and species of Compositae from Central Asia. *75th Anniv. Vol. Sukatsch.*: 354–362.
- MABBERLEY, D. J. 2005. *The Plant-Book, a portable dictionary of the vascular plants*. 2nd ed. Cambridge University Press (SE Asian ed).
- MAITY, D. 2005. *Vascular Plant Diversity of Kanchenjunga Biosphere Reserve, Sikkim*. Ph. D. Thesis (Unpublished), Department of Botany, University of Kalyani, Kalyani, Nadia, West Bengal, India.
- MAITY, D. & G. G. MAITI 2001. Two new taxa of *Lactuca* L. from Sikkim Himalaya. *J. Econ. Taxon. Bot.* 25(3): 748–750.
- MAITY, D. & A. S. CHAUHAN 2002. Kanchenjunga Biosphere Reserve. In: SINGH, N. P. & D. K. SINGH (eds.), *Floristic Diversity and Conservation Strategies in India, In-situ and Ex-situ Conservation*. Vol. V, pp. 2585–2625. Botanical Survey of India, Kolkata.
- MAITY, D. & G. G. MAITI 2007a. *Stebbinsia umbrella* (FRANCH.) LIP. (Asteraceae): A new record for India. *J. Bombay Nat. Hist. Soc.* 104(1): 119–120.
- MAITY, D. & G. G. MAITI 2007b. *The Wild Flowers of Kanchenjunga Biosphere Reserve, Sikkim*. Naya Udyog, Kolkata.
- SENNIKOV, A. N. & I. D. ILLARIONOVA 2008. Generic delimitation of the subtribe Ixeridinae newly segregated from Crepidiinae (Asteraceae–Lactuceae). *Komarovia* 5(2): 57–115, “2007”.
- SHIH, C. 1995. New species of Chinese Compositae. *Acta Phytotax. Sin.* 33: 181–197.
- STEBBINS, G. L. 1940. Studies in Cichorieae: *Dubyaea* and *Sorosseris*, endemics of the Sino-Himalayan Region. *Mem. Torrey Bot. Club* 19 (3): 1–76.
- STEBBINS, G. L. 1953. A new classification of the tribe Cichorieae, family Compositae. *Madroño* 12: 65–81.
- TZVELEV, N. N. 2007. New taxa and new combinations of Asteraceae taxa from the central Asia. *Bot. Zhurn. (Moscow & Leningrad)* 92 (11): 1747–1757. (In Russian).

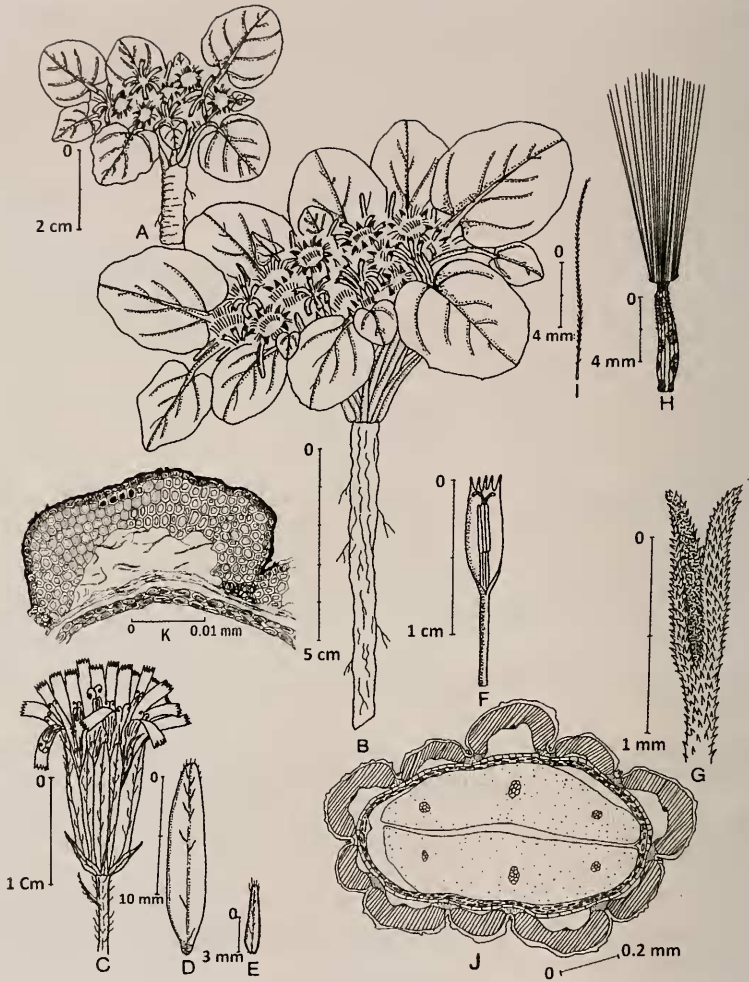


Fig 1. *Tibetoseris depressa*

A var. *depressa*, habit [SINHA & SHUKLA 20455]; B-K var. *pseudoumbrella*: B Habit; C Capitulum; D Inner bract (dorsal face); E Outer bract (dorsal face); F Floret (cypselum and pappus removed); G Stigmatic branches; H Cypselum; I Pappus hair; J T. S. of cypselum (diagrammatic); K T. S. of cypselum (cellular); [MAITI & SHUKLA 22485] (drawing by D. MAITY).

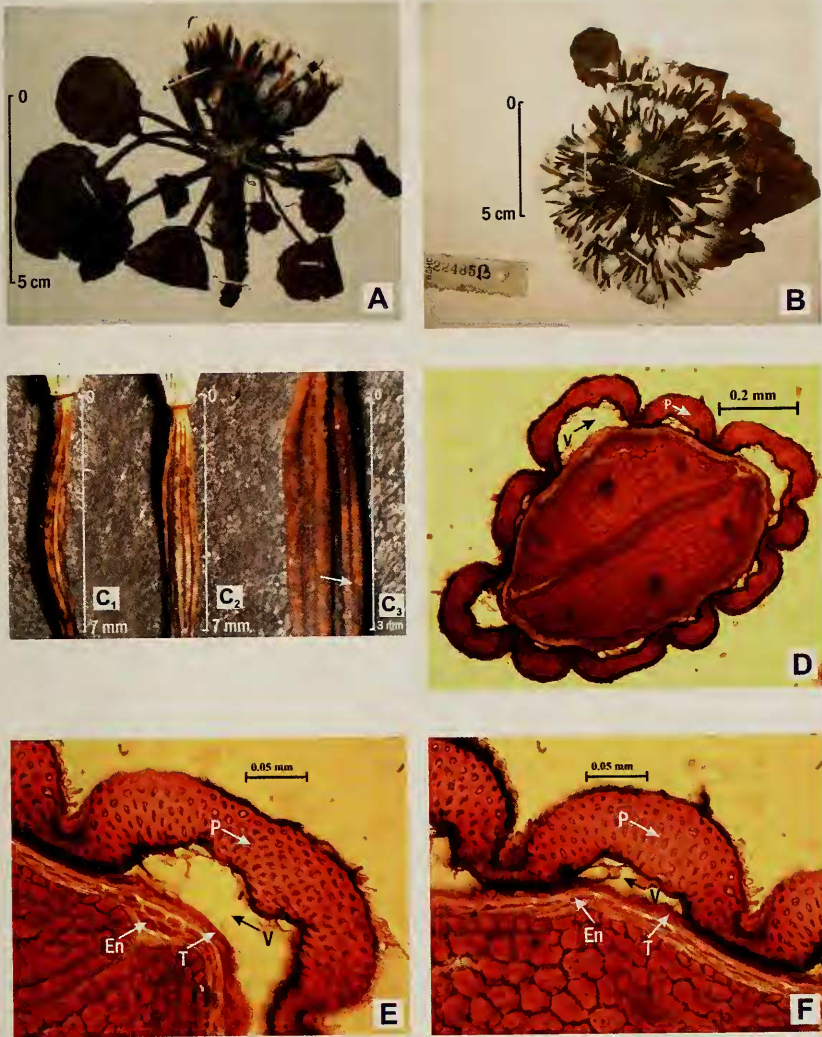


Plate 1. *Tibetoseris depressa*

A *T. depressa* var. *depressa*; **B** *T. depressa* var. *pseudoumbrella* (Isotype); **C** Cypsela [**C**₁ - Lateral view, **C**₂ - Ventral view (MAITY & PRADHAN 26880, BSHC), **C**₃ Separation of major rib (KING's collector 1888, CAL)]; **D** T. S. of cypsela (MAITY & PRADHAN 26880, BSHC); **E** Major rib of cypsela (MAITY & PRADHAN 26880, BSHC); **F** Minor rib of cypsela (MAITY & PRADHAN 26880, BSHC); **P**. Pericarp; **V**. Vallecular canal; **T**. Testa; **En**. Endosperm.

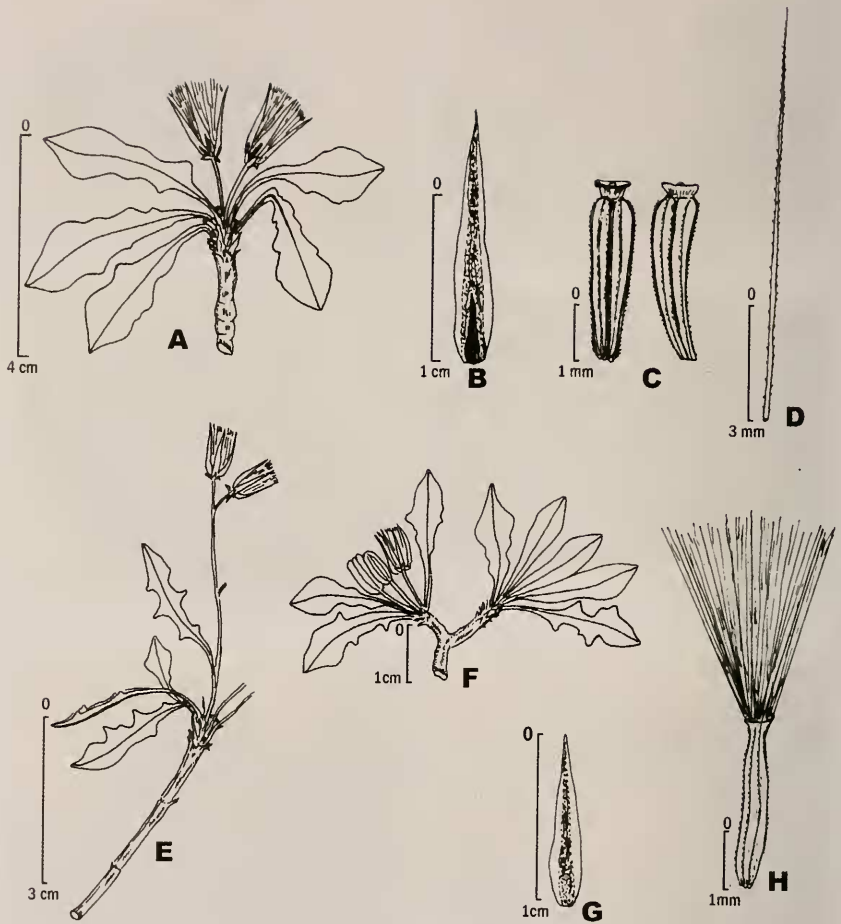


Fig. 2. A-D: *Pseudoyoungia simulatrix*; E-H: *P. gracilipes*

A Habit; B Inner bract (dorsal face); C Cypselas (Pappus removed); D. Pappus hair (LEPCHA 2711, CAL); E Habit (DUTHIE 3090); F Habit; G Inner bract (dorsal face); H Cypselas with pappus (SMITH & CARVE 1892, CAL). (Drawing by D. MAITY).